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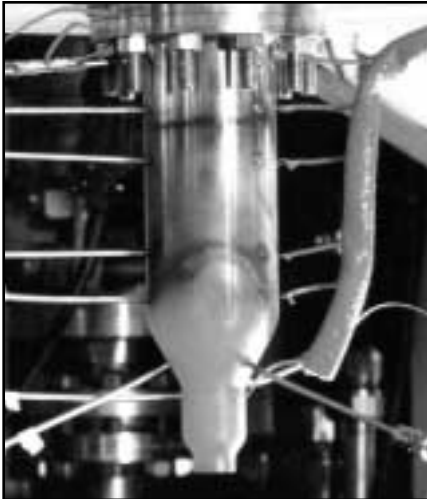
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Aqua launched to study Earth's water cycle



Boeing Rocketdyne hot-fires a 98-percent-hydrogen-peroxide Advanced Catalyst Gas Generator at NASA's Stennis Space Center. (Photo: Boeing Rocketdyne.)

Safer propellants take a step closer to industry reality

NASA's Stennis Space Center and the Rocketdyne Propulsion & Power team of The Boeing Company are celebrating a significant step toward safer on-orbit operations of space vehicles with the completion of successfully testing of alternative rocket propellants.

In March, Stennis completed an unprecedented 249 tests in a 26-day period on the Boeing/Rocketdyne Advanced Hydrogen Peroxide Catalyst Bed, opening the door for testing a 98-percent-hydrogen-peroxide/kerosene torch igniter.

"Data collected during testing at Stennis indicated overall performance was excellent, said NASA's Robert Ross, hydrogen peroxide catalyst bed testing project manager. "This testing paves the way for follow-on testing of advanced turbopumps and injectors being developed for upper stage

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NASA's mission to understand and protect the Earth marked a major milestone May 4 with the launch of the Aqua satellite. Aqua, due to bring unprecedented insight into the world's global water cycle, is the latest sibling in a family of Earth Observing System satellites dedicated to studying Earth and expanding our knowledge of global climate change, and will enhance Earth science research efforts at Stennis Space Center.

During its six-year mission, Aqua will gather information about water in the Earth's system. This information, which will include data about ocean circulation, clouds and surface water, will help scientists better understand how global ecosystems are changing.

Aqua, launched May 4 from Vandenberg Air Force Base, Calif., will fly at an altitude of approximately 438 miles above Earth. Aqua is the sister satellite to NASA's Terra spacecraft, launched in December 1999.

The Aqua and Terra satellites are part

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NASA's Aqua satellite, launched May 4 at 12:55 a.m. CDT from Vandenberg Air Force Base, Calif., on a Boeing Delta-7920-10L expendable launch vehicle, will fly in a near-polar and sun-synchronous orbit.



The University of Southern Mississippi (USM) broke ground for a new Marine Science Laboratory at Stennis Space Center on April 23. Participating in the ceremony, from left, were, Dr. Denis Wiesenburg, chair of USM's Department of Marine Science; Rear Adm. Kenneth Barbor, director of the USM Hydrographic Science Research Center at Stennis; NASA's Roy Estess, Stennis Space Center director; Rear Adm. Thomas Q. Donaldson V, commander of Naval Meteorology and Oceanography Command; Dr. Aubrey K. Lucas, USM acting president; Dr. George Knauer, former director of the Center for Marine Science at Stennis; Dr. Jay Grimes, dean of the USM College of Marine Sciences; and Capt. Philip Renaud, commanding officer of the Naval Oceanographic Office at Stennis.



Representatives from NASA and the resident agencies at Stennis conducted an emergency preparedness drill April 23. Emergency response teams from surrounding communities also participated in the exercise.

Disaster simulation conducted at Stennis

Representatives from NASA and the resident agencies at Stennis conducted an emergency preparedness drill April 23. The drill was designed to test all emergency systems at the center and to be used in planning for any potential mass casualty or bio-terrorism threats.

The exercise was conducted by Stennis emergency preparedness personnel along with emergency response teams from Hancock Medical Center, the Hancock County Civil Defense Office and the sur-

rounding communities of Hancock County and Picayune.

"This was an excellent opportunity to test all the systems in place at Stennis used to deal with any emergency situations that could occur," said NASA's Clyde Dease, Stennis Fire and Emergency Services director.

Dease thanked Hancock County Civil Defense Coordinator Lynette Carbon and emergency teams for helping coordinate the mock disaster.

Mark Craig honored by Purdue University

Stennis Space Center's Deputy Director Mark Craig was named one of Purdue University's Distinguished Engineering Alumni for 2002 in a ceremony at the university in West Lafayette, Ind., April 16.

The award recognizes alumni for outstanding professional achievements. Craig's award recognized his outstanding accomplishments in a career dedicated to the exploration of space. Less than one percent of Purdue engineering alumni have received Distinguished Engineering Alumni Awards. Prior recipients include astronauts Neil Armstrong and Gene Cernan, first and last men on the Moon.

Craig earned a bachelor's degree in astronautical engineering from Purdue in 1971. He pursued engineering post-graduate study at Rice University and completed MIT's Program for Senior Executives. Prior to coming to Stennis, Craig held



Mark Craig

management positions at Johnson Space Center in Houston and NASA Headquarters in Washington, D.C., on a variety of space exploration programs including the Lunar/Mars Space Exploration Initiative and Space Station System and the Space Shuttle Subsystem.

As staff of the NASA Administrator, Craig was an architect of both the NASA Strategic Plan and The Strategy for the Human Exploration and Development of Space. He was a keynote speaker at the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, is a Distinguished Lecturer at the International Space University and is the recipient of many awards, including Federal Engineer of the Year. Craig served as Stennis Space Center acting director from February 2001 until April 2002.

NEWSCLIPS

White House moves to fill NASA deputy administrator position: President George W. Bush has announced his intention to nominate Frederick Gregory as the next deputy administrator for NASA. Gregory currently serves as the associate administrator for the Office of Space Flight at NASA Headquarters in Washington, D.C.

Associate administrator for safety named: Bryan O'Connor, a former NASA Space Shuttle program director, astronaut and Marine Corps test pilot, was named associate administrator for the Office of Safety and Mission Assurance at NASA Headquarters in Washington, D.C.

Deputy associate administrator for International Space Station and Space Shuttle programs named: Ret. Air Force Maj. Gen. Michael Kostelnik has been named deputy associate administrator for International Space Station and Space Shuttle programs, a newly created senior management position within the Office of Human Space Flight at NASA Headquarters in Washington, D.C.

NASA Administrator selects chief engineer: Theron Bradley Jr. has been named the Agency's chief engineer, responsible for the overall review and technical readiness of all NASA programs. Bradley is a former nuclear engineer for the U.S. Navy, serving in the Naval Nuclear Propulsion Program.

New legislative affairs chief tapped: Charles Horner III has been appointed NASA's assistant administrator for legislative affairs. Horner, former principal deputy assistant secretary for the Army for Financial Management and Comptroller, joined NASA in January as deputy assistant administrator for legislative affairs.

Langley director named associate administrator of aerospace technology: Dr. Jeremiah F. Creedon, director of the NASA Langley Research Center, Hampton, Va., has been named associate administrator for the Office of Aerospace Technology at NASA Headquarters in Washington, D.C.

International Space Station Report

ISS photographs offer great opportunity to study Earth's features

Photography of the Earth from the International Space Station has achieved spatial resolutions of less than six meters, an analysis of more than 13,000 images has shown. This means scientists can use photographs taken from the space station to study changes occurring in very small features on the Earth's surface.

The results of this study are discussed in an article in the April 23 edition of the American Geophysical Union journal, *Eos Transactions*.

"The sharpness of the photographs taken by the station astronauts surprised both them and the scientists on the ground," said Dr. Julie Robinson, lead author of the paper and a Lockheed Martin scientist in the Earth Sciences and Image Analysis Laboratory at NASA's Johnson Space Center in Houston. "It has really changed our view of how much detail humans can photograph from orbit."

The first three resident space station crews took 13,442 images of the Earth using digital still cameras, 35-mm cameras, 70-mm cameras and a variety of lenses. Crewmembers produced higher-resolution photographs with the high-magnification lenses by learning to compensate for the relative motion of the Earth below while pointing cameras through a specially built window in the station's Destiny Laboratory.

"Astronauts now consciously track the ground when photographing the Earth," said Dr. Cynthia Evans, co-author of the paper and the manager of the Earth Sciences and Image Analysis Laboratory for Lockheed Martin Space Operations. "Their digital cameras provide instant feedback, allowing crewmembers to refine their tracking and focus techniques."



Space Shuttle Endeavour arrives at Launch Pad 39A shortly after 9 a.m., April 29, to begin processing operations for launch on mission STS-111. The mission is the 14th assembly flight to the International Space Station. Endeavour's payload includes the Multi-Purpose Logistics Module Leonardo and Mobile Base System. The mission also will swap resident crews on the station, carrying the Expedition 5 crew and returning Expedition 4 to Earth. Liftoff of Endeavour is scheduled between 4 and 8 p.m. May 30.



Stennis undergoes ISO 14001 transitional audit

Just one year after Stennis Space Center received ISO 14001 certification for its environmental management system (EMS), the center underwent a transition/registration audit May 1-3. NASA selected National Quality Assurance, Ltd., Acton, Mass., as the new registrar for conformance to ISO 14001 Standard's requirements.

NASA and the NASA contractors, Mississippi Space Services, InDyne, Abacus, Madison Services, Omni-Cube and Occu-Health participated in the ISO audit. "The commitment and professionalism of the personnel involved was integral

to the success of this endeavor," said NASA's Ron Magee, environmental officer at Stennis. "Similarly, each area, from the plumbing and heavy equipment shop to the environmental services staff clearly demonstrated that the ISO 14001 standard had been adopted as a part of daily operational practices."

Stennis was among the first of the Agency's centers to earn ISO certification with its environmental management system. The EMS, Magee explained, provides a comprehensive way for a facility to effectively manage and measure the impacts of operation on the environment.



Members of the NASA History Advisory Committee met at Stennis on April 25. Dr. William Becker, left, professor of History and International Affairs at George Washington University, and NASA's Roger Launias, director of NASA's History Office, Office of External Relations, speak to committee members on a variety of topics.

A Day in the Life of ... B-Complex

Once, a day in the life of the B-Complex at Stennis Space Center would have seen NASA engineers and an assortment of contractors like The Boeing Company working to support a variety of test articles. Today, The Boeing Company occupies the B-Complex not as a contractor, but as a customer. The engineers, mechanics and technicians are all Boeing employees.

The single project is the production and delivery of The Rocketdyne RS-68 flight engine — the world's largest liquid-hydrogen, liquid-oxygen engine — developed by The Boeing Company for the Delta IV family of launch vehicles. In October 1998, NASA signed an unprecedented agreement with Boeing, marking the first time NASA leased test stand facilities to a private company. Boeing planned to assemble and test the engine at Stennis.

"With the signing of the Space Act Agreement among NASA, Stennis Space Center and Boeing, the cooperation and success of the design, construction, research and development, testing and production testing of the RS-68 engine has been exemplary," said NASA's Pat Mooney, RS-68 project manager. "In all of these phases, the 'can do' spirit between the government and private industry for the Delta IV launch vehicle has become the benchmark for

future programs."

Boeing's Ernie Ford, instrumentation technician, checks harness routing against the installation drawing.

Boeing made an initial investment of \$8 million toward upgrading facilities to test its new engine design at the B-Complex.

Boeing also retooled facilities at the former Mississippi Army Ammunition Plant at Stennis to house an \$11 million engine assembly plant. The project created more than 100 new technical and manufacturing jobs. The assembly facility opened in March 2000, and the first RS-68 flight engine was acceptance tested in June 2001.

According to Boeing's Mike Witt, RS-68 senior technical advisor, not since the Space Shuttle Main Engine (SSME), also developed and produced by Boeing Rocketdyne and tested at Stennis, has production of a new propulsion system project, like the RS-68, come along. Witt explained that while there are major differences in the SSME and the RS-68 — the SSME is reusable and is a pre-burner cycle engine — in a nutshell, the more



Above, Boeing's test controllers, Whyte Carte, left, and Maurice Moore, run a status check at the redline validation console in the B-Complex Test Control Center prior to the test of RS-68 flight engine 20006.



Left, Boeing's RS-68 engine is assembled and tested at Stennis Space Center. Stennis was the first NASA center to lease its test facilities to a commercial company.



Boeing's Pablo Gomez, instrumentation engineer, checks the instrumentation configuration on the RS-68 flight engine 20006.

ESAD scientist sees vital tie between research, applications

More than 15 years ago, when Bruce Davis saw how NASA was using remote sensing and geographic information systems (GIS) in urban and regional planning, he knew technology held the future for land use and planning.

"I became interested in remote sensing and GIS while I was the co-director



Bruce Davis

of a Tennessee project using technology in the field of land-use planning," Davis said. "When I saw, by working with a NASA regional applications program, how useful these technologies would be in land use, I decided to become proficient in them."

Davis worked in government planning in the Nashville, Tenn., area for about 10 years before going back to school to learn remote sensing and GIS from a geographic perspective. He earned a master's degree in geography and a Ph.D. in geographic information processing from the University of South Carolina before coming to work with NASA's Stennis Space Center in 1987.

Now the acting chief of engineering for the Earth Science Applications Directorate at Stennis, Davis sees a necessary connection between research and applications. "Research should focus on problem solving," said Davis.

"Worthwhile research must answer a community need. The investment in scientific research and technology should result in answering compelling questions about the economy or quality of life."

At Stennis, Davis has been true to his research philosophy. After the events of Sept. 11, 2001, Davis and a team of scientists responded to a call from the Federal Emergency Management Agency (FEMA) for remote sensing applications. As the coordinator for remote sensing, he provided technology advice to FEMA

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Earth scientists at NASA's Stennis Space Center are at work on projects in North Carolina, Texas and Mexico to help communities better understand flood risk. These efforts hold potential to benefit areas such as this California neighborhood that was devastated when El Niño storms flooded the Russian River in 1998. (Photo: Dave Gatley/FEMA.)

Flood season

NASA helps communities prepare

Next to fire, floods are the most common and widespread of all natural disasters. As communities around the nation prepare for this year's flood season, Earth scientists at NASA's Stennis Space Center are at work on several projects to help communities better understand flood risk.

Flood insurance — not typically included in traditional homeowner's insurance — is one essential element of flood-risk planning. Communities must meet Federal Emergency Management Agency (FEMA)-approved flood mapping requirements to be eligible for flood insurance. Flood insurance premiums are based, in part, on flood-risk maps, which contain detailed information on a community's risk of flood. These maps are prepared using remote sensing data. Remote sensing is the collection and analysis of data about the Earth from distant vantage points.

One type of sensor system, light intensity detection and ranging (LIDAR), collects data by sending and receiving pulses of light. Scientists interpret LIDAR data to detect tiny changes in the Earth's topography and thus predict exactly where floodwaters will go and how they will behave. The accuracy of LIDAR data depends on the number of pulses that are

sent and received per meter of coverage. However, the more accurate the data, the more expensive it becomes for communities to acquire. The optimal pulse rates and coverage for LIDAR data for flood mapping is not yet known.

To get the best flood-risk mapping results for their money, communities need technical requirements guidelines. This is where NASA's Earth scientists can help.

Current and future NASA research projects in North Carolina, Texas and Mexico will help determine appropriate LIDAR accuracy in flood-risk mapping by examining optimum light-pulse rates and the costs associated with those levels of accuracy. These data will help FEMA update its minimum LIDAR accuracy requirements and assist communities considering flood-risk mapping.

"Qualifying results is critical for the most efficient use of LIDAR in flood mapping," said Dr. Bruce Davis, NASA's acting chief of engineering for the Earth Science Applications Directorate at Stennis. "This project is the first one of its type and has the potential to help FEMA determine flood mapping standards and save communities money in flood-risk

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Stennis takes daughters to work

Stennis Space Center participated in the Ms Foundation's 10th Annual National Take Our Daughters to Work Program on April 25. More than 200 young women in grades seven through 12 visited the center and took part in activities that recognized how women have made a difference in the workplace. The program included several hands-on learning sessions and demonstrations that focused on concepts in science, engineering and technology, including a digital photography workshop. The program was sponsored by the Sitewide Federal Women's Program, which is represented by NASA, resident agencies and contractors. Taking part in a digital photography workshop were, clockwise from the keyboard, Ashley Bayona and her sister, Franchesca; Pamela Johnson; InDyne's Bobby Phares; NASA's Dinna Cottrell; and Lorie Liebig.



Von Braun's new exhibit takes folks 'back to the future' at StenniSphere

Back when the space age was in its infancy, one of the era's visionary leaders, Dr. Wernher von Braun, the rocket scientist whose work took Americans to the Moon, sat in his living room in front of a hulking Heath television and read Collier's magazines with articles, some of which he wrote himself, that speculated on the future of NASA's space exploration.

Some of Von Braun's furniture and personal belongings, including the Heath television and 1950s Collier's magazines, are on display at StenniSphere, Stennis Space Center's visitor center, in a new exhibit that recreates a 1960s living room and office scene. The items are on loan to Stennis from the U.S. Space and Rocket Center in Huntsville, Ala.

"The museum bought Von Braun's house, furniture and all, when he relocated to Washington, D.C., in the 1960s," explained Irene Willhite, archivist at the museum. The museum later sold the house and stored the furniture until Willhite got a call from Linda Theobald, NASA public affairs specialist at Stennis, who was interested in borrowing Von



Braun's belongings for the new exhibit.

"The exhibit recreates the time of America's race to the Moon and shows how drastically our lives have changed because of the technologies that came from the space program," said Theobald.

A nostalgic black dial telephone in the living room, for instance, reminds visitors that not too many years ago, they didn't have the convenience of cell phones. The television required hands-on attention to change channels, and there were no remote controls.

In the office exhibit, a heavy gray metal

Dr. Lawrence Deese, M.D., (right), his son, Eddie, and wife, Melodie, at the Wernher von Braun exhibit at StenniSphere. The exhibit contains the design renderings of Dr. Deese's father, the late James H. Deese, who designed the launch facilities still in use at Kennedy Space Center. Dr. Deese loaned the items to the museum.

typewriter sits on a huge, solid wooden desk. The typewriter was electric — state of the art for its time — and equipped with an extra ribbon for making carbon copies.

The office display also holds original renderings by James H. Deese, a pioneer planning engineer who designed the launch facilities still used today at Kennedy Space Center in Florida. Deese's drawing of the facility design is one of the pieces in the exhibit.

Deese's artifacts were provided courtesy of Deese's son, Dr. Lawrence Deese, M.D., of Long Beach.



Members of the Aerospace Safety Advisory Panel (ASAP) visited Stennis Space Center on May 1. ASAP is an independent risk assessment group appointed by the NASA Administrator. Participants in the Stennis meeting included, from left, Arthur Zygielbaum; Otto Goetz; Kenneth Englar; NASA's Robert Lightfoot, director, Rocket Propulsion Test Directorate, Stennis; Dr. Ulf Goranson; NASA's David Lengyel, ASAP executive director; and Forrest McCartney.

B-COMPLEX...

(Continued from Page 4)

powerful RS-68 is easier to assemble and cheaper to produce. "Changes in materials and process technology have reduced the part counts and complexity of manufacture," Witt said. "Many of our crews have SSME experience, but this is the first time in 30 years for them to work on production of a brand new engine."

The first launch of a Delta IV using the RS-68 is scheduled in August. Witt said he expects production and testing schedules to accelerate rapidly once customers are lined up. "Right now, we test an engine about every four weeks. The modifications to the stand will allow us to install and work on two engines at once and increase production when this demand for more engines is increased."



Boeing's Joe Lashly, mechanical technician, installs insulation on RS-68 flight engine 20006.

FLOOD SEASON...

(Continued from Page 5)

mapping and insurance costs.

"As a research and development agency, NASA has a fundamental understanding of how remote sensing works," said Davis.

Since NASA does not provide flood-risk mapping services to communities, it can remain objective in its technical rec-

ommendations for mapping requirements.

Davis, who hopes to organize a workshop in the early summer for flood mapping experts, notes that continued applied research in this area is critical for finding the balance between flood mapping accuracy and cost savings. "NASA's flood mapping projects are a first look at optimal LIDAR requirements in this area," he said. "Much more work is needed in order to apply the best information to the most critical questions about flood mapping."



Lockheed Martin's Space Systems and Technology Services announced a lease for the new 220,000-square-foot Propulsion, Thermal and Metrology Center at Stennis Space Center. Lockheed teamed with the state of Mississippi, Hancock County and NASA to develop the center. The facility, which is scheduled to open late summer, will produce propulsion systems, such as thrusters used for satellites and other spacecraft the company manufactures.

AQUA...

(Continued from Page 1)

of NASA's Earth Science Enterprise, a long-term research effort dedicated to understanding and protecting Earth. NASA scientists at Stennis Space Center's Earth Science Applications Directorate (ESAD) will use data collected by the Moderate Resolution Imaging Spectroradiometer (MODIS) instrument aboard both satellites for a variety of ocean applications.

The MODIS instrument measures visible and infrared energy. Water and plants scatter, reflect or absorb energy differently, and scientists can interpret these differences to "see" ocean color. Along coastlines, suspended sediment is visible as shades of brown.

The color information MODIS provides can also enable scientists to detect an unhealthy aquatic condition known as hypoxia, or low levels of oxygen. These low levels of oxygen present a danger to marine life and are harmful to the world's fisheries. Northern Gulf of Mexico fisheries account for approximately one-third of the national fisheries harvest, and hypoxic conditions in the Gulf have a negative impact on this resource.

"The addition of the MODIS instrument aboard Aqua will greatly enhance our efforts to better understand coastal ocean processes," said Dr. Richard Miller, chief scientist for NASA's ESAD. "This understanding will, hopefully, lead to effective applications of ocean color data to important economic, environmental and homeland security issues within the coastal environment."

PROPELLANTS...

(Continued from Page 1)

engines under NASA's Space Launch Initiative."

The results from the catalyst bed testing at Stennis and the igniter testing at the Air Force Research Laboratory in California finishes two years of extensive testing of hydrogen peroxide propellants that could lead to the use of this less toxic alternative for storable upper-stage rocket propulsion.

Utilizing safer, less toxic propellants that meet operational performance requirements has been a long sought goal of the propulsion industry.



Eating for maximum productivity

With today's busy schedules and long work hours, it's important to keep in mind that you're only human. Your body is a machine that will break down if you forget to fuel it properly. The trick to keeping that engine of yours purring is to eat regular, small meals with a variety of nutrients.

Skipping breakfast is a common, unhealthy habit. When you wake up in the morning, the first thing you need to do is fuel up. The secret to sustained energy and keeping control of your weight is to eat small meals more frequently.

Instead of a cheeseburger lunch that turns you into a zombie for the rest of the day, try a series of small, healthy meals. Coffee, candy and other common office snacks will only give you a brief energy boost. Caffeine stimulates your nervous system, but it doesn't contain calories, which are your body's fuel. Sugar breaks down quickly in your system, giving you only a brief pick-me-up.

The key to consistent energy and maximum productivity is planning. Before you go to work think about what you will eat over the course of your day. Prepare healthy snacks from a variety of different food groups — not just starchy favorites like pretzels and crackers.

QUICK LOOK

■ **The Annual NASA Shrimp Boil** is scheduled Friday, June 21, at the Cypress House pavilion. The event is open to NASA employees, family, retirees and guests. For more information, contact the NASA Exchange at Ext. 8-7764.

■ **Hurricane Season begins June 1.** The annual Hancock County Hurricane Awareness Fair is scheduled June 5 from 10 a.m. until 3 p.m. at the Stennis International Airport. The Stennis Earth Imaging Center and representatives of the Naval Oceanographic Office will participate. For additional information, contact the Hancock County Project Impact coordinator Sue Chamberlain or Lynette Carbon, Hancock County Civil Defense coordinator, at (228) 467-9226.

■ **May is Asian Pacific American Heritage Month.** An exhibit highlighting the contributions and achievements of Asian Pacific Americans, including NASA astronauts Leroy Chiao and the late Ellison Onizuka, is on display in the lobby of Bldg. 1100. The theme for the 2002 Asian Pacific American Heritage Month is "Unity in Freedom."

■ **The Stennis Wellness Center's** membership special — a \$25 savings — is available to employees through the end of May. For more information, call Ext. 8-3950.

DAVIS...

(Continued from Page 5)

and emergency personnel. "NASA seeks to assist the nation in times of emergency and to enable better use of science and technology for the benefit of the public," said Davis.

Working with FEMA, the team provided advice on the use of remote sensing technology and data, including making recommendations for changes in the processing of thermal imagery and the development of a formula for answering questions about debris. "Technical information provided by NASA made a real difference in how remote sensing was used during the disaster response," Davis said.

Davis again served the public in a stand-by capacity during the 2002 Winter Olympics. A "tiger team," a group of experts who can be called away from their regular activities to respond to an emergency, was assembled for the Olympics. Davis' team, who had workstations already configured, agreed to provide remote sensing acquisition, data processing and technical advice if requested by FEMA, and would remain as long as required.

"Science is critical to the nation," Davis said. "It is our obligation as scientists to direct research efforts where they are most needed."

LAGNIAPPE

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